

Electrification of Melbourne Suburban Railways



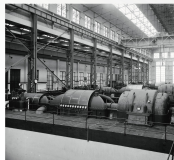
Electrification of Melbourne Suburban Railways was recognised by Engineers Australia with an Engineering Heritage National Marker in 2019.



Department of Transport



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Newport (A) power station turbine hall. VPRS 12000 P1, H211



Overhead wiring and support structures at Kewspine. Combined support structure and signal gantry in foreground with three sets of upper quadrant semiautomatic semaphore home signals. VPRS 12000 P5 S5121



Jolimont rotary converter substation, 1916. VPRS 12000 P4 H223

Overview

In May 1919, the first regular passenger electric train services commenced on the Sandringham and Essendon suburban railway lines. By 1923, an ambitious project for electrification of the suburban railway lines was effectively completed. At the time, it was claimed to be the largest suburban railway network in the world to be successfully converted from steam locomotive to electric traction. It was an immediate success in terms of increasing rail patronage and reducing operating costs.

Deliberations

Although originally mooted in the closing years of the nineteenth century, the first detailed assessment was made in 1908 by UK consultant Charles Merz, under a commission from the Victorian Government. Whilst Merz's report was broadly favourable, the Railway Commissioners opted for deferment, but resolved that all further upgrading work on the suburban network be undertaken with future electrification in mind. Notably, new passenger rolling stock in the form of wide-bodied sliding door passenger cars to a design developed by Thomas Tait, Chairman of the Railways Commissioners 1903-10, were being built at the Newport workshops with steel underframes and other provisions to facilitate later conversion to electric traction. These became known as 'Tait trains', or irreverently as 'Red Rattlers', and collectively saw service on the electrified network for 65 years.

Following the deliberations of a Royal Commission into Melbourne's railway and tramway systems in 1910 -11, Merz was re-appointed to review and update his original report. The revised report, submitted in July 1912, included costings based on actual tender prices for major plant



Map of the Electrification 1920.

and equipment, with alternatives for HV single-phase AC and medium-voltage DC traction. The latter was shown to be the more cost effective for Melbourne and a 1500 volt DC traction system with an overhead contact wire was recommended. After further parliamentary committee investigations, the electrification scheme was approved in December 1912.

Construction

In accordance with the consultant's proposal, the scheme was constructed in three successive stages. It included the building of a dedicated 78 MW coal-fired power station at Newport that was then the largest electricity

generating plant in the southern hemisphere. High voltage AC from the Newport power station supplied some sixteen traction substations that utilised rotary converter plant to in turn furnish the 1500 V DC for supply to the trains via the overhead wiring. The latter tailed trackside structures to support a contact wire above all of the electrified rail tracks. At the time of its implementation in Melbourne, it was a world first application of 1500 V DC for the electrification of a suburban railway system.

Commencing concurrent with the electrification project, automatic electric signalling was progressively implemented to more safely enable shorter headway times between successive train services. Most of the first series of automatic electric signals were upper quadrant semaphore signals but subsequently coloured light signals were increasingly adopted.

Implementation

The overall implementation of the scheme was protracted by onset of the First World War which effected the delivery of major electrical plant and local labour resources. Although Merz & McLellan were retained to overview construction, local

professional engineers and technologists contributed in many ways to the ultimate successful completion of this major enhancement to Victoria's public transport infrastructure.

The initial electrification of the Melbourne suburban railway network and its subsequent augmentations, including newer technology AC to DC conversion plant and successive generations of rolling stock, has facilitated the development of the metropolis and continues in its role as an essential and widely used public transport service.



Two car Tait train at Ashburton, 1982. Courtesy of Geelong & South Western Rail Heritage Society



Interior of a typical sliding door Tait car with internal aisle. VPRS 12000 P3 ADV1888



Seamless restored Tait train at Newport workshops. Photo - M Pearce